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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|------------------------|------------------|
| 10/685,571 | 10/16/2003 | Tatsuya Suzuki | 8070-1003 | 7159 |
| 466 | 7590 | 03/10/2005 | EXAMINER | |
| YOUNG & THOMPSON 745 SOUTH 23RD STREET 2ND FLOOR ARLINGTON, VA 22202 | | | LINDSAY JR, WALTER LEE | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2812 | |

DATE MAILED: 03/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/685,571 | SUZUKI ET AL. | |
| | Examiner | Art Unit | |
| | Walter L. Lindsay, Jr. | 2812 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28, 30 is/are pending in the application.
- 4a) Of the above claim(s) 1-5, 7-12, 14-18, 20-23, 25-28 and 30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 6, 13, 19 and 24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>10/16/2003</u> . | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

This Office Action is in response to an Election filed on 11/30/2004

Currently, claims 1-28 and 30 are pending. Claims 1-5, 7-12, 14-18, 20-23, 25-28 and 30 have been withdrawn. Claim 29 has been canceled.

Election/Restrictions

1. Applicant's election without traverse of claims 6, 13, 19 and 24 in the reply filed on 11/30/2004 is acknowledged.
2. Claims 1-5, 7-12, 14-18, 20-23 and 25-28 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 11/30/2004.
3. Newly submitted claim 30 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claim 30 does not act upon a high-k dielectric being wet etched by organic solvents, as the elected species is directed towards

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 30 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Specification

4. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is

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requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 6, 13, 19 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brask et al. (U.S. Patent No. 6,855,639 filed on 8/1/2003) in view of Christenson et al. (U.S. Patent No. 6,835,667 filed 6/14/2002).

Brask show the method substantially as claimed in Figs. 2A. -5 and corresponding text as: forming an insulating film (102) on a semiconductor substrate (100), said insulating film comprising at least a high-k insulating film that has higher dielectric constant than that of the silicon oxide film (col. 2, lines 5-25); and selectively removing said insulating film via wet etching to expose said surface of said semiconductor substrate (col. 2, line 60- col. 2, line 28) (claim 6).

Brask lacks anticipation only in not explicitly teaching that: 1) selectively removing said insulating film via a wet etching with a chemical solution containing an organic solvent as a main component to partially expose said surface of said semiconductor substrate (claim 6); 2) the organic solvent is a solvent having polar group (claim 13); 3) the organic solvent is selected from the group consisting of: isopropyl alcohol; ethylene glycol; 2-heptanone; cyclopentanone; methylethyl ketone; glycol ether; propyleneglycol monomethyl ether; and propyleneglycol monomethyl acetate (claim 19); and 4) the organic solvent is isopropyl alcohol, and said chemical solution contains not less than 90 % vol. of isopropyl alcohol (claim 24).

Christenson teaches the etching of High-K films. The High-K film can be etched selectively with an organic mixture that can consist of Isopropyl alcohol (col. 2, lines 49-58). This aids in the reduction of HF used in order to etch High-K dielectrics.

It would be obvious to one of ordinary skill in the art, at the time the invention was made, to modify the method of Brask by removing the insulating film with an organic solvent, which has a polar group and consist of an organic solvent from the group of: isopropyl alcohol; ethylene glycol; 2-heptanone; cyclopentanone; methylethyl ketone; glycol ether; propyleneglycol monomethyl ether; and propyleneglycol monomethyl acetate, and that the solvent contains no less than 90% vol. isopropyl alcohol as taught by Christenson, with the motivation that Christenson teaches that the addition of an organic solvent reduces the amount of HF used to etch High-K dielectrics.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter L. Lindsay, Jr. whose telephone number is (571) 272-1674. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Walter L. Lindsay, Jr.
Examiner
Art Unit 2812

WLL

March 4, 2005